Wildlife Inventories in the Boundary Bay Watershed

Anne Murray
Independent researcher

Abstract
Boundary Bay is a globally significant site for migratory and wintering birds, spanning the border between British Columbia and Washington. Apart from some bird studies, there has been no previous attempt to document the wildlife use of the bay and associated uplands and watershed. This ecosystem contextual information is essential for assessing the impact of individual developments and landscape changes on wildlife populations.

I set out to build a comprehensive inventory of mammals, birds, reptiles, and amphibians using this important area. I performed an extensive literature review and contacted naturalists, government agencies, museums, biological consultants, and numerous experts. I determined which species have been recorded in the last ten years (confirmed sighting or specimen), or are highly likely to occur, and which were present in the recent past or historically.

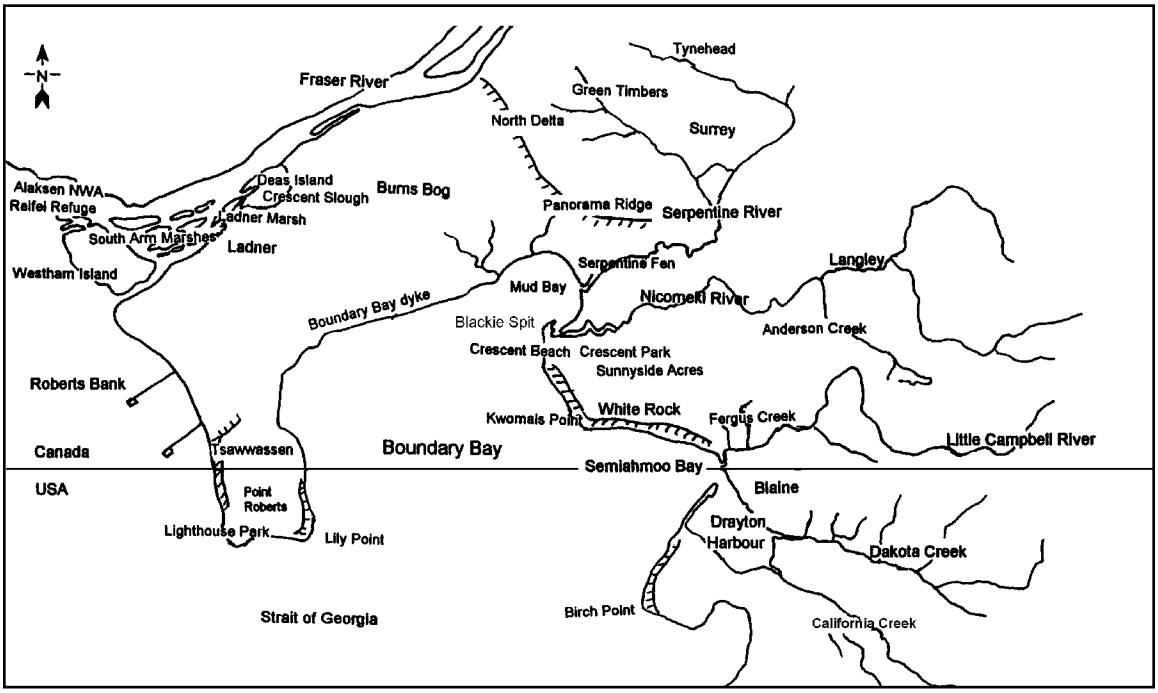
My results show that at least 306 bird, 59 mammal, seven reptile and eleven amphibian species have been recorded in the Boundary Bay area in recent times, or are considered as likely to occur. Four native mammals are confirmed extirpated. New questions arise: the interaction between introduced species and native ones is not well understood and very little is known about nocturnal species. There is much scope for further study.

Introduction
Boundary Bay is a globally significant site for migratory and wintering birds and a major component of the Fraser River Estuary Important Bird Area, which is ranked number one in Canada (Bird Studies Canada 2002). The 15-km wide, shallow marine bay spans the border between British Columbia and Washington and is bordered by salt and estuarine marshes. The surrounding delta lowlands were dyked and drained for agriculture in the 1890s. Many hectares remain in agricultural use, although they are crossed by transportation corridors and interspersed with housing developments and an airport. Some of the agricultural land is mature fallow pasture, or oldfield, an essential habitat for Townsend's voles and many resident and wintering raptors that prey on them. Freshwater marshes and bog are other important habitats of the delta and river valleys. The bay is surrounded by Pleistocene era uplands that were once covered in dense forests of cedar, hemlock and fir, but are now predominantly suburban, with remnant woodland parks. Rivers and streams are bordered by riparian habitat.

Due to the many jurisdictions covering this area, there has been no overall wildlife inventory compiled for Boundary Bay, its uplands and watershed. Baseline information is essential for ecosystem management, land use planning and ensuring the success of future conservation efforts.

Methodology
In February 2002, I began compiling an inventory of mammals, birds, reptiles and amphibians of the Boundary Bay area, using published data and naturalists' records. I was particularly interested in comparing older records with those from the last 10 years. The study area is in the heart of the Georgia Basin-Puget Sound region. I defined it as all arms of Boundary Bay, including Mud Bay, Semiahmoo Bay and Drayton Harbor, as well as the entire watershed discharging into these bays (Map 1). I included Roberts Bank and Westham Island, south of the South Arm of the Fraser River, and Burns Bog, over a quarter of which drains into Boundary Bay (Helbert and Balfour 2000) To compile the overall inventory, I researched written reports, checklists and site inventories from all relevant jurisdictions and advertised in newspapers and on the Delta cable television for past and recent sightings. I also contacted naturalists, biologists and other experts.

Previous Studies
Several studies in the last 30 years have drawn attention to the ecological importance of the study area. The globally significant migratory and wintering bird populations were addressed in a 1987 Canadian Wildlife Service paper, that had a detailed inventory of birds and included a list of mammals, reptiles and amphibians in the Fraser delta. (Butler and Campbell 1987). In 1990 Surrey identified its environmentally sensitive areas (Abs et al. 1990) and Delta Municipality followed with a multi-government study of the environment and land use in Delta, including components on birds and agriculture (Butler 1992; Klohn Leonoff 1992). Drayton Harbor watershed was the subject of an ecological assessment in 1991 (Puget Sound Cooperative River Basin Team 1991). The Boundary Bay Conservation Committee presented an overview of the Boundary Bay ecosystem as part of a proposal for a biosphere reserve (Murray and Taitt 1992).



Map 1. Boundary Bay study area.

In 1999, an extensive ecological review of Burns Bog was carried out by a team of researchers as part of a provincial environmental assessment (Hebda et al. 1999). Numerous studies have focused on bird species and ecology, particularly the western sandpiper and great blue heron (e.g. Butler et al. 1996) and on selected mammals, e.g. coyotes (Lampa 2001), bears (McIntosh and Robertson 2000), small mammals (Taitt 1991; Zuleta and Galindo-Leal 1994), squirrels (Gonzales 1999) and a bat colony (Harris and Nagorsen 1996). Amphibians and their habitats have been well mapped in Delta but not to the same extent in other municipalities (Rithaler 2002). Bird lists have been prepared for some regional parks and environmental assessments have been done for portions of the study area, most of which include lists of potential and known species (e.g. Kistritz 1992; Haycock & Mort 1988).

The need to document wildlife and ecological information is well recognized. Government staff and consultants that I contacted were interested in obtaining copies of the Boundary Bay inventory once completed and reference was made to the general lack of funding for this type of work. Coordination across jurisdictions is seen as essential for effective wildlife conservation. The Fraser River Estuary Management Program's draft 2003 update plan stresses the need for an integrated view of the estuary and ecosystem-based management, stating: "To apply the features and functions approach to effectively manage the Fraser River estuary, we need to document and consolidate information." (FREMP 2003)

Additional inventories are currently being done by individuals and groups. I hope to incorporate their findings as my study evolves. For example, I participate with other volunteers in the Beached Bird Survey coordinated by Bird Studies Canada and the Coastal Observation and Seabird Survey Team. A regular raptor survey is conducted by local birders. Volunteer naturalists also participate in the Coastal Waterbird Survey, Christmas Bird Counts , the Seagrass Conservation Initiative, and citizen science studies conducted by the Canadian Community Monitoring Network.

An initial annotated list of mammals, reptiles and amphibians for the Boundary Bay area has been completed (Murray 2003) and I am in the process of compiling an annotated bird list.

Results

My results show that 57 marine and terrestrial mammal species, 323 bird species, 7 reptile species and 11 amphibian species have been recorded in the Boundary Bay area in the last 30 years, with 45 mammals, about 310 birds, 5 reptiles and 10 amphibians recorded within the last 10 years. A further 6 mammal species (all bats) are considered very likely to occur. A number of species have been extirpated, but since early documentation of wildlife is scarce, only species known to have been extirpated since 1900 were listed in the inventory. These are one introduced and four native mammals, four

introduced and two native birds and one amphibian. Elk and wolf were hunted out by 1900, while the last cougars and snowshoe hare were seen in the 1970s and 1980s. Three bird species have been extirpated as breeding populations, but still occur as transients (burrowing owl, western bluebird, purple martin). Two species of mammal (Keen's long-eared myotis, long-tailed weasel) are of questionable status.

Of the 323 species of birds recorded in the Boundary Bay area, 28% are known to breed in the area and are either year round residents or summer visitors. 58% of species are regularly occurring migrants, 15% are casual visitors, recorded most years in very small numbers, and 10% are accidental, instances of one or two sightings of birds far from their normal range. (This adds to more than 100% since some species have both migratory and resident populations).

Discussion

I was not able to determine population trends for the majority of species in the inventory, given the limited number of records. However, a few general observations are possible. Some native mammals are widespread and abundant, such as the raccoon and coyote, while others are present in small numbers in localized areas, e.g. mountain beaver, black bear. It is believed that there are five black bears still present in Burns Bog (McIntosh and Robertson 2000) and bears may still occur in the Drayton Harbor watershed (Puget Sound 1991). There are also anecdotal accounts of bears using the power cut lines through Surrey. The populations of many smaller mammals are poorly understood, particularly those of nine bat species that are within known range. Western spotted skunk and red fox have declined considerably in the last 10 to 20 years; the spotted skunk is probably extirpated and the fox is now rare. The spread of coyotes may be implicated in their decline. Snowshoe hares have also been extirpated in the last 30 years, while the introduced eastern cottontail survives successfully in many areas. Douglas's squirrels have declined in upland areas where forests have been logged, e.g. Tsawwassen, and have been replaced in many suburbs by the introduced eastern gray squirrel that spread from Stanley Park, Vancouver. California sea lion have increased in numbers, but killer whales have declined.

Among the reptiles, garter snakes are still relatively common, although many observers did not distinguish between the three local species so their relative abundance and distribution could not be gauged. I could not find recent records for rubber boa and northern alligator lizard and they may now be extirpated. An introduced population of red-slider turtles occurs in a lake in South Delta. Some amphibian species are declining. Oregon spotted frog was previously recorded for the study area, but is now considered extirpated (Hebda et al. 1999). Introduced green frogs and American bullfrogs are both common. Five species of terrestrial and aquatic salamanders occur in suitable habitat, the long-toed salamander experiencing a decline in recent years (Rithaler 2002).

The overall bird population using the Fraser delta has been estimated at 1.4 million birds (Butler and Campbell 1987). The majority of these are waterfowl and shorebirds, particularly dabbling and diving ducks, western sandpiper, black-bellied plover and dunlin. Fifty species of shorebird have been recorded in Boundary Bay (Price 1990) and 40 species of waterfowl. Trumpeter swans have made a dramatic recovery since the hunting season was closed and it is hoped that the wintering population of brant may also rebound. Wintering brant were estimated at 1100 birds in 2002 and 2003, with more passing through on spring passage (Breault 2003).

The diversity and number of resident and wintering raptors is nationally significant. The Boundary Bay area still has breeding barn owls, great horned owls and western screech owls, although the latter have declined, as have breeding and wintering short-eared owls. Four colonies of great blue herons occur in the study area; the one at Point Roberts is believed to be the largest in the Pacific Northwest, with over 200 nests. Sixteen species of hawks, eagles, falcons and harriers have been recorded. The neotropical migratory songbirds are sometimes overlooked compared with waterfowl, shorebirds and raptors. At least 15 warblers are found around Boundary Bay, the majority of them breeding summer visitors. Insect-eating birds have fared the worst of all birds since European settlement. All the extirpated native breeding species, including western bluebird, purple martin, yellow-billed cuckoo and burrowing owl are insectivorous, as are Vaux's swift and common nighthawk, both of which have also declined.

The fact that 25% of bird species occurring in the bay are casual or accidental species suggests that transitions in migration behaviour may still be taking place, as part of the post ice age climatic amelioration. A number of birds, e.g. great egret, American avocet, are expanding their range or wander north after breeding, turning up in the bay most years. The large number of accidentals makes Boundary Bay a very exciting destination for birders and could have economic implications if this activity were to be exploited.

Alien plant and animal species are very abundant in the Boundary Bay area and can be pests. Many were deliberately established or came with other introduced species. Sportsmen have over the years tried to introduce a number of game birds but only ring-necked pheasants survive, in declining numbers. Other aliens which are now resident include 7 mammals, 5 birds, 2 reptiles and 2 amphibians.

Conservation Issues

A number of issues are likely to effect future wildlife populations, with habitat availability being most important. Protection of agricultural land and riparian areas is critical. Much of the delta is still fertile farmland and many crops, such as pumpkins, corn and potatoes, are compatible with wildlife use. Intensive or industrialized farming, e.g. cranberries, greenhouses, reduce the amount of habitat available. Birds can also create problems for farmers. Heavy grazers such as snow geese, trumpeter swans and American wigeon crowd onto remaining farmland, resulting in over-cropping and puddling. Cooperative programs with landowners through, for example, the Delta Farmland and Wildlife Trust, help to address issues of this kind.

New solutions are needed for old problems. To counteract flooding, a historical problem in the delta, engineers use extensive riprap for banks and cut down trees growing in the dykes, thus reducing riparian habitats. New methods of flood control and bank maintenance, as pioneered in other jurisdictions, need to be explored. Casual treatment of ditches and slough banks can often lead to wetland habitat loss and fish, amphibians, songbirds and small mammals are all affected.

Disturbance by human activities is becoming more of an issue. Migrating shorebirds only have a limited time to feed in the intertidal and must contend with natural harassment by merlins and peregrine falcons, which sends flocks whirling out over the bay, especially at high tide (Dekker 1999). The presence of dogs and humans on the nearby beach, regardless of whether they are chased, further disturbs the birds, putting them to flight. Port and ferry causeways and terminals occupy many hectares of land and have had a considerable impact on water flow, salinity and turbidity, altering marine life on Roberts Bank, one of the three component areas of the Fraser River Estuary Important Bird Area. My inventory showed that numerous species of wildlife have been recorded over the years in this area, but there has not been thorough documentation of the changes that occurred. The port has recently applied for two developments which would effectively double its size, potentially a high impact on the Fraser River estuary ecosystem.

The vast populations of migratory and wintering waterfowl and shorebirds easily meet BirdLife International's criteria for Important Bird Area (IBA) status, and the designation was granted to the Fraser River Estuary in 1991. A total of 13 species have IBA globally or nationally significant populations: western grebe, red-necked grebe, Pacific great blue heron, trumpeter swan, snow goose, northern pintail, American wigeon, mallard, black-bellied plover, western sandpiper, dunlin, glaucous-winged gull and barn owl (Bird Studies Canada 2002). Designation as a Wetland of International Importance under the Ramsar Convention has not yet been applied to Boundary Bay, despite the fact that the bay far exceeds the criteria. Alaksen National Wildlife Area on Westham Island is the only Ramsar site so far designated in the Fraser River Estuary. Boundary Bay has also not received Western Hemispheric Shorebird Reserve Network status, though again it meets the criteria. The applications for both are the responsibility of the Province of British Columbia. Designations of this kind draw national attention to the importance of the area for birds, and help drive conservation efforts.

Some further questions

My study immediately raised a new set of questions. Despite being located close to the major urban centre of Greater Vancouver, the Boundary Bay watershed has not been well studied as an ecological whole. Clearly we need to know more about the population sizes and status of the species using the area. A coordinated approach from all interested parties will be necessary to achieve this. The data collected should be maintained through a central repository such as the Community Mapping Network. I list below a few further questions that could effectively be addressed by researchers interested in this area.

- What is the nature of inter-species interactions, e.g. between eastern gray squirrels and the Douglas' squirrel, between the red fox and the coyote, between gull species which occur in hybrid forms in this area?
- Why have spotted skunks disappeared?
- What bats are present in the area? Where?
- Why can eastern cottontails survive in the study area while snowshoe hares have been extirpated?
- What long-term changes are occurring in populations? What are the instigators of change?

By addressing these and many other questions raised by this initial inventory we might begin to address the key issue: how can we maintain biodiversity in the Boundary Bay area?

Acknowledgements

I should like to thank all who contributed to this study by providing records, answering questions and lending slides, in particular David Blevins who provided the majority of animal and landscape slides for my conference presentation..

Sources

Abs, Susan, Catherine Berris, Alan Ferguson and Sarah Groves, 1990, *Finding the Balance, Environmentally Sensitive Areas in Surrey*, prepared for the District of Surrey, Planning and Development Services, Surrey, B.C. 67pp.

Bird Studies Canada, 2002 website www.ibacanada.com

Breault, Andre, 2003 Canadian Wildlife Service, personal communication.

Butler, R.W and Campbell, W. *The Birds of the Fraser River delta*, Canadian Wildlife Service, Environment Canada, 1987

Butler, R.W. (Ed.), 1992, *Abundance, distribution and conservation of birds in the vicinity of Boundary Bay, British Columbia*, Technical Report Series No.155, Canadian Wildlife Service, Environment Canada and BC Environment, 132pp.

Butler, Robert W, Francisco S. Delgado, Horacio de la Cueva, Victor Pulido and Brett K. Sandercock, 1996, *Migration Routes of the Western Sandpiper*, Wilson Bull. 108 (4), pp 662-672

Dekker, Dick, 1999, *Bolt from the Blue, wild peregrines on the hunt*, Hancock House Publishers Ltd., Surrey, 192 pp

FREMP, 2003, *A Living Working River,* The Estuary Management Plan for the Fraser River, Fraser River Estuary Management Program, draft, 61pp

Gonzales, Emily, 1999 *Eastern Grey Squirrels - An Introduction to an Introduction* Discovery Vol. **28**, No.1: 22-25

Harris, Chris and David Nagorsen, 1996, *Investigation of Bats and Barn Owls in Barns at the Alaksen National Wildlife Area, Delta, B.C. April to July* Canadian Wildlife Service, Environment Canada

Haycock, R. and Hazel Mort, 1988, *Campbell Valley Regional Park, Biophysical Description*, GVRD, Vancouver.

Hebda, R.J, K.Gustavson, K. Golinski & A.M.Calder, 2000, *Burns Bog Ecosystem Review Synthesis Report*, B.C. Environmental Assessment Office, Victoria

Helbert, Sheldon & John Balfour, 2000, *Burns Bog Ecosystem Review: Hydrology*, EBA Consultants, for the Environmental Assessment Office, Victoria and Delta Properties Ltd.

Kistritz, R, Glen Porter and Ken Summers, 1992, *Environmental Overview of the North Delta Area*, Planning Department, Corp. of Delta.137pp.

Klohn Leonoff Ltd., 1992, *Delta Agricultural Study*, B.C. Ministry of Agriculture, Fisheries and Food,

Agriculture Canada, B.C. Agricultural Land Commission, Delta Farmers Institute and the Corporation of Delta, 130 pp.

Lampa, Christine, 2001, *Coyotes in the Cit,y* Discovery, Vol. **30**, No.2:

McIntosh, K. Anre and Ian Robertson, 2000, *Status of Black Bears in Burns Bog*, Discovery Vol. **29**, No.1: 26-31

Murray, Anne, 2003, *Wildlife Inventories in the Boundary Bay area*, Discovery, Vol. **32** No.1:20-26

Price, Michael, 1990, *Shorebirds of Boundary Bay, An annotated checklist*, Discovery, Vol.**19**. No.4:125-135

Murray, Anne & Mary Taitt, (Eds.), 1992, *Ours To Preserve, A Proposal for a Boundary Bay Biosphere Reserve,* Boundary Bay Conservation Committee, Delta, British Columbia, 49pp

Puget Sound Cooperative River Basin Team, 1991, *Drayton Harbor Watershed, Whatcom County, Washington* prepared for Drayton Harbor Watershed Management Committee.

Rithaler, R.C, 2002, *Fish and Amphibian Spawning Timing in Delta, British Columbia*, Corporation of Delta and accompanying map: *Delta Watersheds Fish and Amphibian Distribution*

Taitt, Mary, 1991, *Delta Small Mammal Study 111*, April to August , BC Ministry of Environment, Surrey.

Zuleta, G.A. and C. Galindo-Leal, 1994, *Distribution and Abundance of four species of small mammals at risk in a fragmented landscape*, WWR 64. Ministry of Environment, Lands and Parks, Wildlife Branch, Victoria, B.C. 34 pp